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Making Up The Difference: Ontario Women in Engineering

Results of a survey of women engineers conducted November 1989

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APEO Women in Engineering Advisory Committee

Marta Ecsedi (Chair), P.Eng.
Christine Bell, P.Eng.
Erica Belling, P.Eng.
Julia Biedermann, P.Eng.
Boris Stoicheff, PhD
Mary Ann Crichton, P.Eng.
Debra DiLeo, P.Eng.
Eva Guzewski, P.Eng.
Jane Phillips, P.Eng.
Gail Behrend, P.Eng.

Summary

A woman's place is more likely to be in her job than in her home these days. The likelihood of that job being in engineering has been increasing during the last decade, but there are still some bridges to cross. Women are hardly breaking down the doors to enter engineering. In 1987, only about 12% of the students in Ontario engineering schools were female, while in some medical schools over 50% of the enrolment was female. Law schools report 40-50% of their classes are women. Women's membership in the APEO stands at around 3%.

The APEO's Women in Engineering Advisory Committee recently surveyed the Association's 1200 female members, to identify the issues and concerns of women in engineering and to find ways for the APEO to encourage more women into the profession. The women indicated they are happy in their jobs and in their chosen profession. However, although their pay is comparable to their male peers, female engineers state that their professional development lags behind, and that family commitments and maternity leave may penalize them professionally.

Over 70% of the respondents were married and about half have children. About 40% of those working less than five years thought that maternity leave could adversely affect a career compared to almost 55% of those working 10-15 years. Only 11% of the workplaces offer day-care but women indicated stronger preferences for flex time or part-time options.

Respondents believe the lack of role models is a barrier for young women interested in engineering.

Other Survey Highlights:

- Chemical and civil engineering are the most popular disciplines with women.
- 80% of the respondents have been working for less than 15 years, compared with about 50% for all engineers.
- Most of the respondents are concerned that engineering is not being adequately promoted among women in high schools and universities.
- Respondents believe the lack of role models is a barrier for young women interested in engineering and for the professional development of female engineers.
- Most women believe the family is the most important influence in a person's decision to pursue engineering.
- Two thirds of the respondents agree that a sole woman in an engineering team experiences additional stresses due to her visibility.
- Of the respondents, 38% thought the image of engineering students was a deterrent to a woman choosing engineering. This figure rose to 50% among women in the work force less than five years.
- About 45% of the respondents believe men are promoted more readily than women and over 50% agreed that the "old boys' network" is a benefit not shared by female engineers.
- Most women are happy with their membership in the APEO and with the services it offers.

Introduction

In September 1989, the Women in Engineering Advisory Committee (WEAC) surveyed the APEO's female members to:

1. identify the opportunities and concerns of women in engineering;
2. determine what actions are required by WEAC and the APEO to encourage more women into engineering; and
3. collect names of female engineers interested in participating in the APEO's speakers' bureau.

The survey questionnaire was designed by a sub-committee of WEAC. A consultant, Union Communications of Toronto, was retained to print the survey, administer it, collect and tabulate the results and summarize the responses.

Questionnaires were mailed out in October 1989. A total of 730 responses was received by December 31, 1989, indicating a response rate of over 60%.

The consultant tabulated the first 400 responses and presented the results to WEAC in November.

Survey Design

The survey was designed to produce qualitative rather than quantitative data about female engineers, to complement information available from other APEO surveys.

The 110-question, multiple-choice survey questioned respondents about attitudes, affirmative action/employment equity, promotion practices, pay equity, role models/mentors, APEO perceptions and suggestions, university background, career perceptions and demographics. It also asked respondents to indicate if they were interested in participating in the APEO speakers' bureau. The 10-page survey booklet was mailed out to 1200 female engineers in Ontario accompanied by a postage-paid return envelope.

Survey Results

Respondents are happy in their jobs and in their chosen profession. However, although their pay is comparable to that of their male peers, female engineers state that their professional development lags behind, and that family commitments and maternity leave may penalize them professionally.

Female engineers clearly experience pressures their male counterparts don't.

Most of the respondents believe role models are important for career choice and development. They think role models are best introduced at the elementary and high school levels. The present lack of role models could be contributing to the low numbers of young women interested in entering the profession and could be hindering the professional development of women in engineering. Most women believe the family is the most important influence in a person's decision to pursue engineering, and the importance of role models and mentors in family life should be promoted. Although role models and mentors are considered very important for career choice and development, most respondents had not had the benefit of either. Female engineers have a commitment to promoting their profession through public speaking and mentoring: 41% state that they have been engineering mentors, and 38.5% have had experience in public speaking about their careers.

The number of women in the profession has shown a steady rise in the past 20 years (Fig. 1, page 9) but female engineers clearly experience pressures their male counterparts don't, among them balancing a career and family (85%) and additional stress from being the only woman on an engineering team (72.3%). Over 70% of the respondents were married and about half have children. About 40% working less than five years thought that maternity leave could have adverse repercussions on a career compared to almost 55% of those working 10-15 years (Fig. 2, page 9). Only 11% of the workplaces offer day-care but women indicated stronger preferences for flex time and part-time options (Fig. 3, page 10).

Although most respondents reported no special programs are held for women to encourage them to apply for promotions, over 50% believed women were given equal opportunities to apply for promotions. About 45% of the respondents believe that men are promoted more readily than women and over 50% agreed that the existence of an "old boys' network" is a benefit not shared by female engineers (Fig. 4, page 10). In written comments, several women indicated they felt slighted by the masculine language used in the profession, such as the term "Sons of Martha." This indicates that some changes in the language of our profession may help to present it as less of a masculine preserve.

The image of engineering students is a deterrent to women choosing engineering, according to 38% of the respondents. This figure rose to 50% among women with less than five years in the workforce who perhaps have a more vivid memory of student life (Fig. 5, page 11). This negative perception of engineering students is an area where improvement is needed.

Respondents rated responsibilities as the biggest factor affecting salary increases, yet 46% thought that males are given responsibility more readily. Many believed the relationship with supervisors is a big factor in salary increases. However, societal factors can often affect the relationship a female engineer has with her supervisors, who tend to be mostly male.

Chemical and civil engineering are the most popular disciplines with women. Of respondents, 80% have been working for less than 15 years, compared with about 46% for all engineers.

The majority of respondents (79%) worked in manufacturing (32.5%), in government or government-funded industry (26.8%), or transportation, communication and utilities (20%). Some significant differences were noted among the three industries. The manufacturing industries were least likely to provide extra benefits such as parental or educational leaves. Respondents working in manufacturing were less likely to have a structured identification system for promotion or salary review practices (Fig. 6, page 11).

Utilities, transportation and communication industries had the smallest percentage of women with children, while government or government-funded had the largest.

As well as being pleased with their career decision, most women were satisfied with their membership in the APEO and with the services it offers. Most of the respondents are concerned that engineering is not being adequately promoted among women in high schools and universities. WEAC believes this is partly due to the public perception of engineering as an aloof profession whose contributions to society are rarely understood or appreciated.

There was a strong show of support for the proposed WEAC activities (see Table 1, page 12). Over 75% of the respondents agreed that WEAC should be involved in the promotion of female role models to youngsters.

Almost 30% of the respondents were of British origins. Women engineers from Eastern Europe make up the biggest cultural group among those working more than 15 years (41%) while those in the workforce five years or less showed a wider distribution of various origins (Fig. 7, page 12). The percentage of visible minorities has increased from 4.7% for those working 10-15 years, to over 15% of the respondents working less than five years.

The survey's high response rate (over 60%) indicated a strong interest in the status of women in engineering. Many women took the time to write comments. Especially heartening are the over 200 names submitted to the APEO speakers' bureau. The fact that these women volunteered time from their busy schedules to promote engineering indicates their commitment to the profession.

Conclusions

Results of the survey indicated that there are factors in the profession which can limit women's development in the field and deter them from entering the profession. Many of these factors are societal; WEAC believes that as more women enter the profession some of these problems will diminish.

Some of the APEO's Strategic Objectives coincide with proposed WEAC plans to increase the numbers of female engineers in the profession.

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Perceptions of Engineering

The APEO wants to develop and introduce programs describing the engineering contribution to society. This dovetails with WEAC's objective to present the profession to women in a more human fashion, as less of a masculine preserve and more of a valuable opportunity.

Continued Professional Development

The APEO wants to increase membership awareness of the need for and value of continued professional development. WEAC is interested in the development of training seminars and programs for female engineers who have taken time off to raise children. The availability of such programs would assure women that making the investment to become engineers would be worthwhile, as they would be able to continue with their careers after an interruption.

Membership Needs and Expectations

As well as providing the usual services to its members, the APEO and WEAC should become an information source about the profession and encourage women to enter engineering.

WEAC Goals

WEAC hopes that by the year 2000, 50% of the people admitted to engineering schools in Ontario will be women.

For the future WEAC hopes that by the year 2000, 50% of the people admitted to engineering schools in Ontario will be women. Both short-and long-term plans will be necessary to bring this about.

Short-term plans:

1. Set up a resource catalogue aimed at elementary and high school students, to portray an engineering career as an attractive option for both men and women. The catalogue would comprise written and audiovisual material, speakers and subject matter.
2. Produce a video aimed at grades 7-9. Current research has shown that this is the time girls start to lose interest in math and sciences, subjects necessary for an engineering course.
3. Publish a pamphlet concerning women in engineering. This could be tied in with the resource catalogue and updated yearly or be a pamphlet directed specifically to high school girls asking them to consider a career in engineering.
4. Set up mentoring and networking systems.
5. Provide APEO representation at relevant conferences and seminars.

Long-term goals:

1. Actively promote WEAC resources.
2. Continue to assess WEAC goals and the status of women in engineering.
3. Promote retraining programs for women temporarily out of the profession.
4. Maintain mentoring and networking systems.
5. Liaise with women in other technical, scientific or non-traditional fields. Set up common goals and programs.

The demand for technologically skilled people is predicted to exceed the supply over the next few decades. The engineering profession must appeal to women or we lose 50% of a shrinking resource base. The profession must therefore change its image and attitudes of its members to attract women to it. The lack of women in engineering not only means that women are being deprived of a rewarding career but also that the profession is being deprived of their talents, energies and abilities. The 1990s should be seen as the decade to make up the difference. The profession needs the best and brightest people society can offer if it is to continue helping to solve the challenges of the next century.

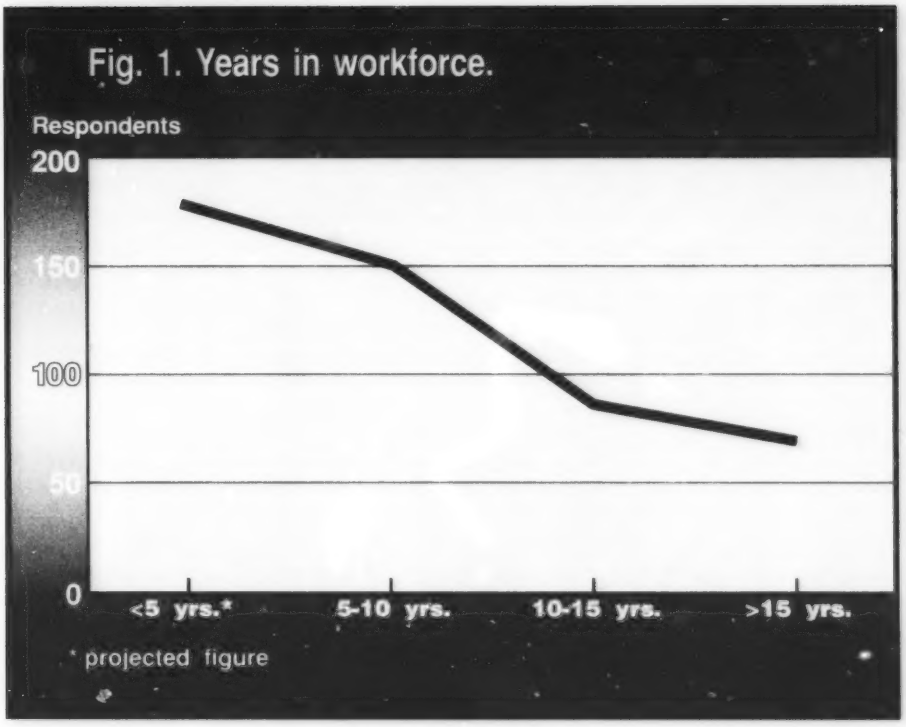


Fig. 1. Years in workforce.
Respondents
200
150
100
50
0
<5 yrs.*
5-10 yrs.
10-15 yrs.
>15 yrs.
* projected figure

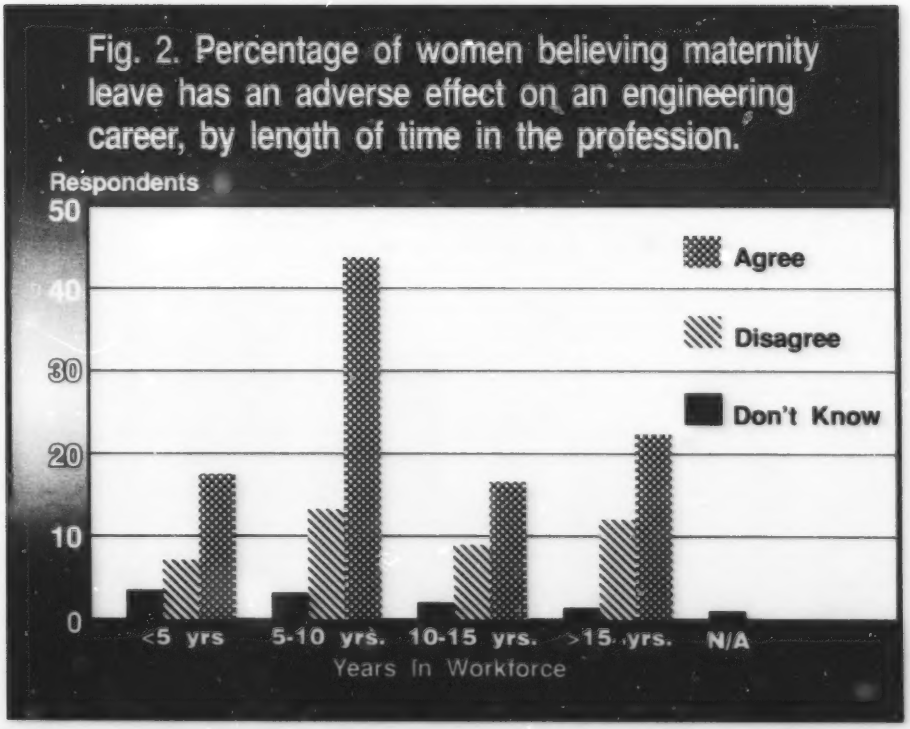


Fig. 2. Percentage of women believing maternity leave has an adverse effect on an engineering career, by length of time in the profession.
Respondents
50
40
30
20
10
0
Agree
Disagree
Don't Know
<5 yrs
5-10 yrs.
10-15 yrs.
>15 yrs.
N/A
Years In Workforce

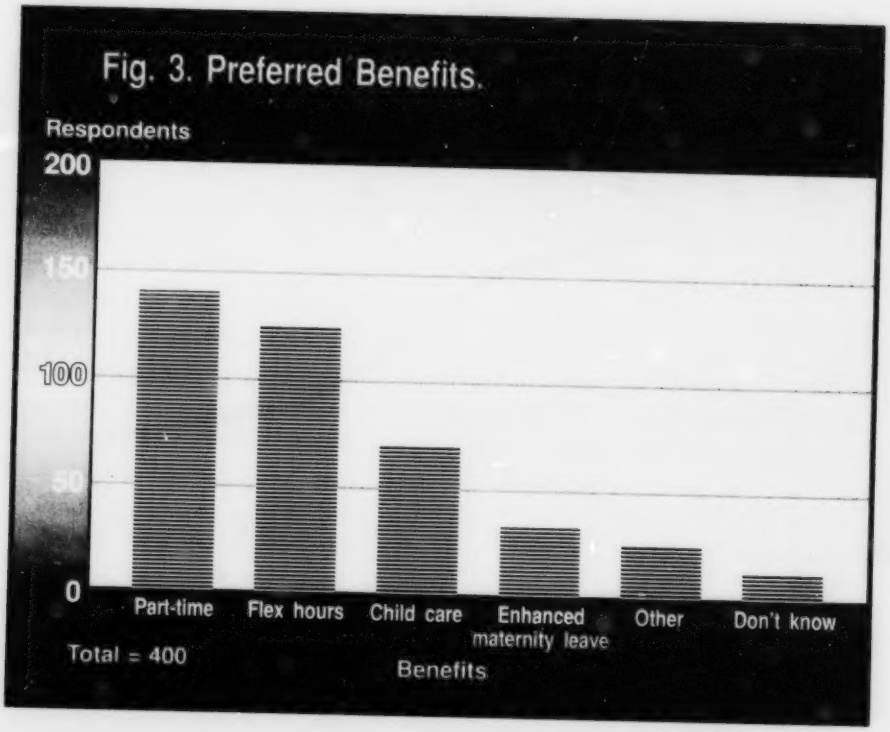


Fig. 3. Preferred Benefits.
Respondents
200
150
100
50
0
Part-time
Flex hours
Child care
Enhanced maternity leave
Other
Don't know
Total = 400
Benefits

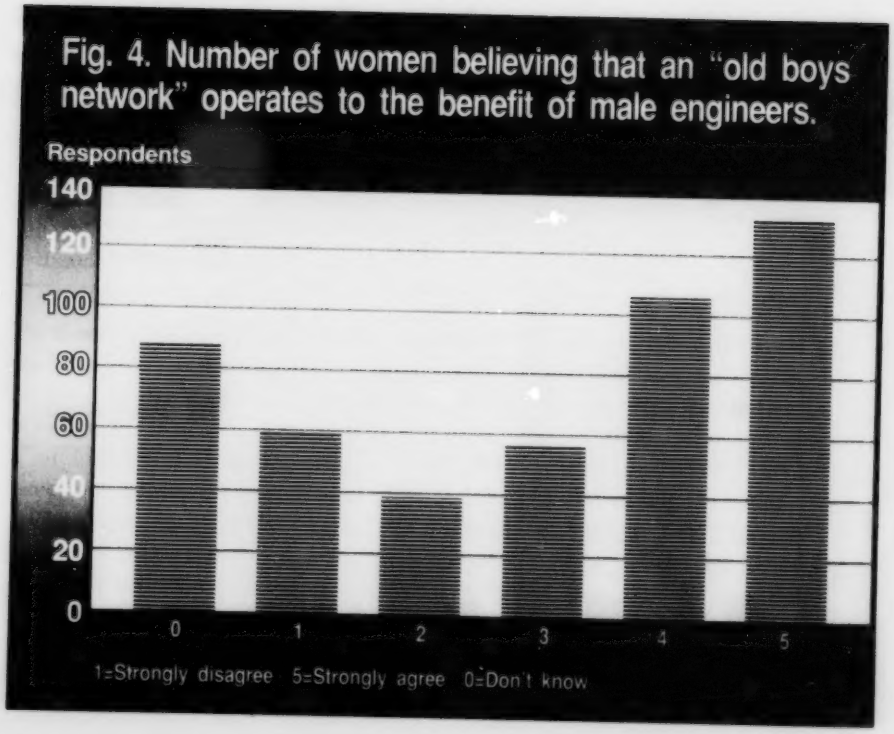


Fig. 4. Number of women believing that an "old boys network" operates to the benefit of male engineers.
Respondents
140
120
100
80
60
40
20
0
0
1
2
3
4
5
1=Strongly disagree 5=Strongly agree 0=Don't know

Fig. 5. Number of women believing that the image of engineering students is a deterrent to women entering the profession.

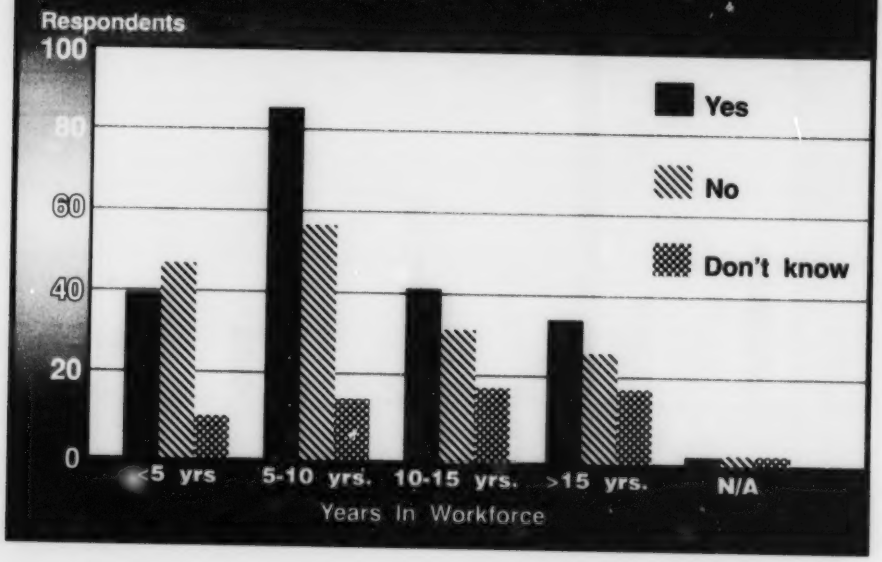
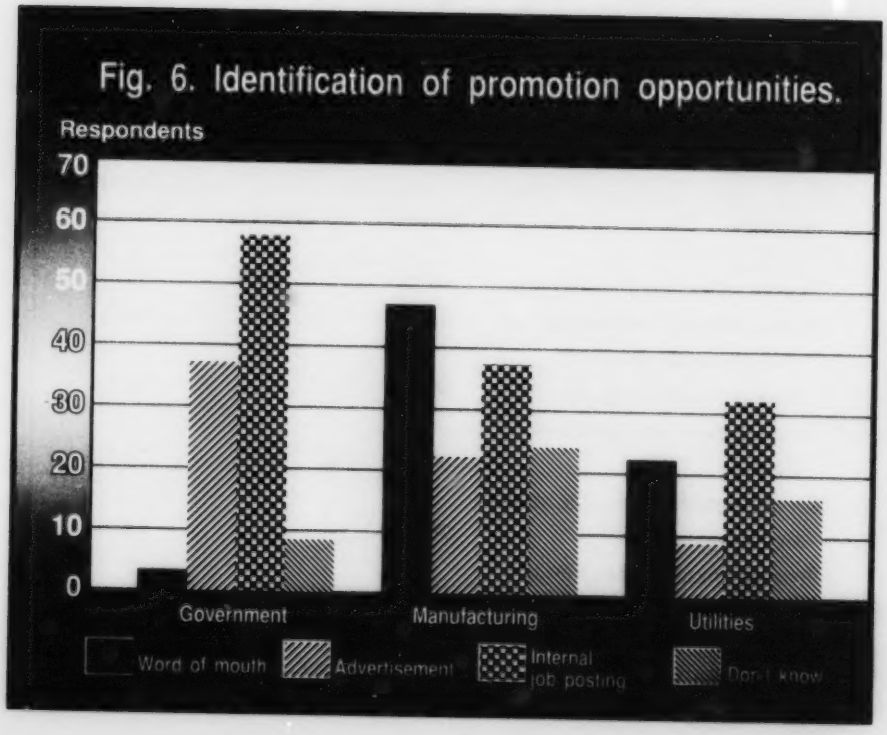


Fig. 6. Identification of promotion opportunities.



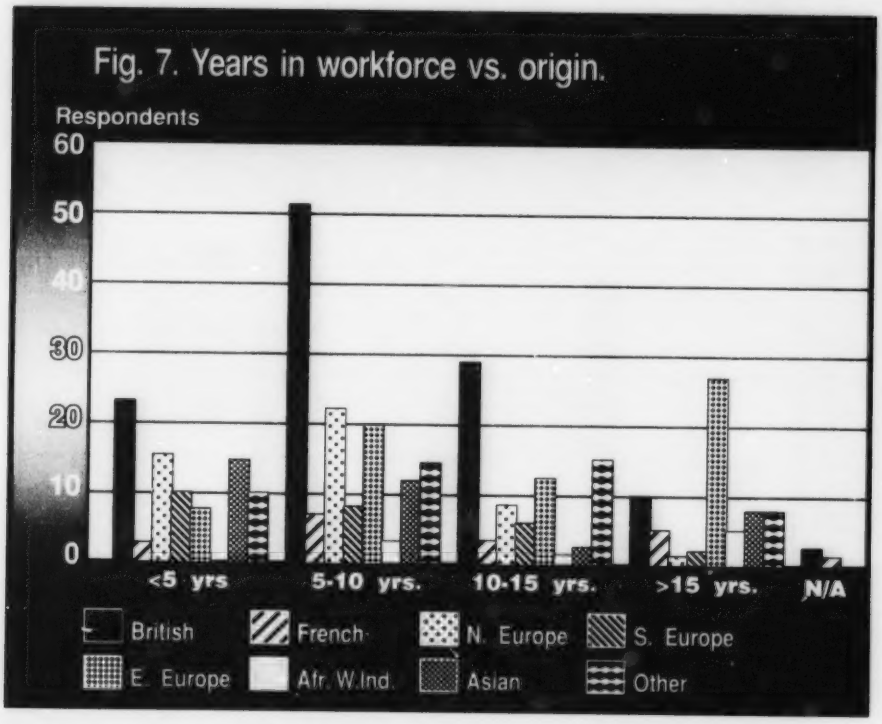


Table 1

Support For Various WEAC Activities

Activity	Agree	Disagree	Don't Know
Survey of female membership	54.3%	9.8%	35.9%
Public relations initiatives	61.8%	11.5%	26.7%
Publications dealing with women in engineering	65.5%	14.3%	20.2%
Development of a speakers' bureau	55.8%	14.5%	29.7%
Promotion of female role models to youngsters	75.3%	8.3%	15.4%
Production of a video about women in engineering	54.3%	20.8%	24.9%